In the Claims

A complete listing of the claims follows immediately hereinafter.

1. (currently amended) A plasma reactor system for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust that overlies an unaltered region of an original photoresist layer, said system comprising:

a treatment chamber within which a plasma is generated using a hydrocarbon gas in combination with oxygen gas, with said hydrocarbon gas in a range of from approximately 15% to 85% of an overall mixture with the oxygen gas, in a way which subjects the implant crust to the plasma to remove the implant crust, formed responsive to introduction of said implanted dopant, said plasma being free of halogens, at least to an approximation, to remove the implant crust without the use of introduced halogens.

2. (original) The system of claim 1 wherein said hydrocarbon gas produces low molecular weight radicals in said plasma.

3. (original) The system of claim 2 wherein said low molecular weight radicals include a molecular weight of less than approximately 30.

4. (original) The system of claim 2 wherein said radicals include at least one of CH_2 radicals and CH_3 radicals in the plasma.

5. (canceled)

6. (previously amended) The system of claim 5 wherein said implant crust overlies an unaltered region of an original photoresist layer and said plasma formed using said hydrocarbon gas in combination with oxygen is used to remove said unaltered region of photoresist.

7. (previously amended) The system of claim 6 wherein said implant crust and said unaltered region of said original photoresist layer are simultaneously removed using said plasma formed with said hydrocarbon gas in combination with oxygen gas.

8. (original) The system of claim 7 wherein said plasma is generated with downstream plasma generation means.

9. (original) The system of claim 1 wherein the treatment object is a semiconductor wafer.

10. (canceled)

11. (original) The system of claim 1 wherein said hydrocarbon gas is methane.

12. (currently amended) ~~The system of claim 1 wherein~~ A plasma reactor system for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust that overlies an unaltered region of an original photoresist layer, said system comprising:

a treatment chamber within which a plasma is generated using a hydrocarbon gas in combination with oxygen gas, with 75% methane and 25% oxygen form an overall gas mixture, in a way which subjects the implant crust to the plasma to remove the implant crust, formed responsive to introduction of said implanted dopant, said plasma being free of halogens, at least to an approximation, to remove the implant crust without the use of introduced halogens.

13. (original) The system of claim 1 including an inductive coil for inducing power into the plasma at a power level of at least 200 W.

14. (currently amended) ~~The system of claim 1~~ A plasma reactor system for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust that overlies an unaltered region of an original photoresist layer, said system comprising:

a treatment chamber within which a plasma is generated using a hydrocarbon gas in combination with oxygen gas in a way which subjects the implant crust to the plasma to remove the implant crust, formed responsive to introduction of said implanted dopant, said plasma being free of halogens, at least to an approximation, to remove the implant crust without the use of introduced halogens including an inductive coil for inducing power into the plasma at a power level of approximately 3000 watts.

15. (currently amended) ~~The system of claim 1~~ A plasma reactor system for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust that overlies an unaltered region of an original photoresist layer, said system comprising:

a treatment chamber within which a plasma is generated using a hydrocarbon gas in combination with oxygen gas in a way which subjects the implant crust to the plasma to remove the implant crust, formed responsive to introduction of said implanted dopant, said plasma being free of halogens, at least to an

approximation, to remove the implant crust without the use of introduced halogens including a parallel plate reactor for generating said plasma.

16. (original) The system of claim 1 including a microwave plasma source for generating said plasma.

17. (original) The system of claim 1 wherein said treatment chamber is at a pressure selected in the range of approximately 0.5 to 15 Torr.

18. (original) The system of claim 1 wherein said treatment chamber is at a pressure of approximately 3 Torr.

19. (original) The system of claim 1 wherein said chamber is at a pressure of approximately 1 Torr.

20. (currently amended) In a plasma reactor system at least for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust, a method comprising:

generating a plasma in a plasma chamber using a hydrocarbon gas in combination with oxygen gas, with said hydrocarbon gas in a range of from approximately 15% to 85% of an overall mixture with the oxygen gas, such that the plasma is halogen free, at least to an approximation, in a way which subjects the implant crust to the plasma for removing the implant crust, previously produced by introduction of said implanted dopant, without the use of introduced halogens.

21. (original) The method of claim 20 wherein said hydrocarbon gas produces low molecular weight radicals in said plasma.

22. (original) The method of claim 21 wherein said low molecular weight radicals include a molecular weight of less than approximately 30.

23. (original) The method of claim 21 wherein said hydrocarbon gas is capable of generating at least one of CH_2 radicals and CH_3 radicals in the plasma.

24. (canceled)

25. (previously amended) The method of claim 24 wherein said implant crust overlies an unaltered region of an original photoresist layer and the method includes using said plasma to remove said unaltered region of photoresist.

26. (previously amended) The method of claim 25 including simultaneously removing said implant crust and said unaltered region of said original photoresist layer using said plasma.

27. (original) The method of claim 26 including downstream generation of said plasma.

28. (original) The method of claim 20 wherein the treatment object is a semiconductor wafer.

29. (canceled)

30. (original) The method of claim 20 wherein said hydrocarbon gas is methane.

31. (currently amended) ~~The method of claim 20 wherein~~ In a plasma reactor system at least for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust, a method comprising:

generating a plasma in a plasma chamber using a hydrocarbon gas in combination with oxygen gas having 75% methane and 25% oxygen to form an overall gas mixture such that the plasma is halogen free, at least to an approximation, in a way which subjects the implant crust to the plasma for removing the implant crust, previously produced by introduction of said implanted dopant, without the use of introduced halogens

32. (original) The method of claim 20 including the step of inducing power into the plasma at a power level of at least 500 watts.

33. (previously amended) The method of claim 20 including inducing power into the plasma at a power level in a range from approximately 500 to 5000 watts.

34. (previously amended) The method of claim 20 including pressurizing said treatment chamber at a pressure selected in the range of approximately 0.5 to 15 torr.

35. (previously amended) The method of claim 20 including pressurizing said treatment chamber at a pressure of approximately 3 torr.

36. (previously amended) The method of claim 20 including the step of pressurizing said treatment chamber at a pressure of approximately 1 torr.

37-80. (canceled)

81. (currently amended) ~~The system of claim 1 wherein~~ A plasma reactor system for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object,

said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust that overlies an unaltered region of an original photoresist layer, said system comprising:

a treatment chamber within which a plasma is generated using a hydrocarbon gas in combination with oxygen gas, using 50% methane and 50% oxygen to form an overall gas mixture, in a way which subjects the implant crust to the plasma to remove the implant crust, formed responsive to introduction of said implanted dopant, said plasma being free of halogens, at least to an approximation, to remove the implant crust without the use of introduced halogens.

82. (currently amended) ~~The method of claim 20 wherein~~ In a plasma reactor system at least for use in removing an implant crust that is formed as an outermost layer of a photoresist pattern that is supported by a treatment object, said implant crust being formed responsive to exposure of the treatment object to a high dose ion implant which introduces an implanted dopant into the treatment object as well as into the photoresist, thereby producing said implant crust, a method comprising:

generating a plasma in a plasma chamber using a hydrocarbon gas in combination with oxygen gas, with 50% methane and 50% oxygen to form an overall gas mixture such that the plasma is halogen free, at least to an approximation, in a way which subjects the implant crust to the plasma for removing the implant crust, previously produced by introduction of said implanted dopant, without the use of introduced halogens.

83. (currently amended) A method for treating a workpiece, comprising:

forming a patterned layer of photoresist on a device side of the workpiece;

exposing the photoresist and a selected region of the workpiece to a high dose ion implantation to implant a dopant species into the selected region of the workpiece as well as into said photoresist to produce an implant crust as an outer layer of the photoresist in an interaction responsive to implantation of said dopant species;

generating a plasma using a hydrocarbon gas in combination with oxygen gas, wherein 50% methane and 50% oxygen form an overall gas mixture, such that the plasma is halogen free, at least to an approximation; and

exposing the implant crust to the plasma to remove the implant crust, previously produced by introduction of said implanted dopant.

84. (previously presented) The method of claim 83 including selecting the implant species as one of arsenic, phosphorus and boron.

85. (previously presented) The method of claim 83 including exposing said workpiece with an ion energy ranging from 500 eV to 100 KeV and an implant ion dose greater than 1.0×10^{15} ions/cm^2.

86. (previously presented) The method of claim 83 wherein the hydrocarbon gas is methane.

87. (canceled)